EM375 Mathcad Homework

1.   Do problem 6.3 in the text using the mean(x), median(x), stdev(x) and Stdev(x) functions. In addition, calculate the population and sample standard deviations by manually creating the equations for S and σ (equations 6.6 and 6.5 in the text). CHECK you get the same answers using Mathcad functions, your manually entered equations, and using your calculator.

$$S = \sqrt{\sum_{i=0}^{N-1} \frac{\left(x_i - \bar{x}\right)^2}{(N-1)}} \qquad s = \sqrt{\sum_{i=0}^{N-1} \frac{\left(x_i - \bar{x}\right)^2}{N}}$$

2.   In 2001 Jeff Conine had a batting average of 0.310. Use the Binomial distribution to calculate the probability that he goes four-for-four in his next game. (Note that the factorial key is the exclamation point!)

$$P(r) = \frac{n!}{r!(n-r)!} p^r \left(1-p\right)^{n-r}$$

3.   If the results of a certain test are said to follow a normal distribution with a mean of 83% and a population standard deviation of 9%, calculate the percentage of students expected to fall between 70% and 90%. Use Mathcad' to numerically integrate equation 6.29 in the text.

$$P(x_1 \le x \le x_2) = \int_{x_1}^{x_2} f(x)dx$$

$$\text{with } f(x) = \frac{1}{s\sqrt{2p}} e^{-(x-m)^2/2s^2}$$

4.   Use Mathcad's plotting feature to duplicate Figure 6.4 in the text for σ=0.5 and σ=1.0. Change the Mathcad "axes", "traces", and "labels" features to produce a quality graph.

5.   Generate two column vectors which represent the first two columns of the normal distribution chart on page 131 of the text. Create "z" as a range variable from 0 to 4 in increments of 0.1. Remember that the second column, A(z), is the area under the curve:

$$\int_0^z \frac{1}{\sqrt{2p}} e^{-z^2/2}$$

Display the A(z) column vector with four decimal places.

6.   Solve the following simultaneous equations using both the Solve Block (Given/Find) and matrix operations. Confirm you get the same result both ways.

$$x + y + z + q = 100$$
$$4x + 27y = -356$$
$$q + 39x = 57$$
$$5x + z + q = 79$$